discover any cause likely to produce such an effect, it put me upon examining whether the balance might not be magnetic enough to produce the irregularity observed in its rate of going. I took the balance out of its situation in the watch, and after removing the pendulum spring, put it into a poising.tool, intending to approach it with a magnet, but at a considerable distance, to observe the effect, while at the same time the distance of the magnet should preclude the possibility of the magnetic virtue being thereby communicated to the balance. I had no sooner put it into the tool than I observed it much out of poise—that is, one side appeared to be heavier than the other; but, as it had been before examined in that particular by a very careful workman more than once, I was at a loss to determine what to think of the effect I saw; when happening to change the position of the tool upon the board, the balance then appeared to be in poise. As there could be no magic in the case, it appeared that the balance had magnetic polarity, as no other cause could produce the effect I had witnessed, and which was repeated as often as I chose to move the tool from the one position to the other. It happened that I was then sitting with my face to the south—a circumstance that led me, in placing the plane of the balance vertically, to put it north and south, and of course the axis east and west, the only position in which the magnetic influence could make itself most apparent, and which will account for the circumstance not having been observed by the workmen who examined the poise of the balance before I did; for, as often as I placed the plane of the balance vertically between east and west it was in poise, whichever end of its axis was placed toward the south.

Having pretty well satisfied myself as to the cause, I now proceeded to determine the poles of the balance. With that view I placed its axis in a vertical situation, and of course its plane was horizontal; and I was much surprised to find that in that position it possessed sufficient polarity to overcome the friction upon its pivot, for it readily turned on its axis to place its north pole toward the north. Making a mark on that side, that I might know its north pole, I then repeatedly turned that point toward the south; and, when left at liberty, it as often resumed its former position, performing a few vibrations before it quite settled itself in its situation and came to rest, exactly as a needle would do if suspended in the same manner. I was extremely happy that that I had observed these effects before I brought a magnet to make the experiment I first intended, as I might, and as others also might have concluded, that the polarity had been produced by the approach of the magnet. I now, however, brought a magnet into the shop, and presenting its south pole to the marked side—that is, to the north pole of the balance, the balance continued at rest; but upon presenting the north pole to the marked place, it immediately receded from the magnet, and resumed its former position whenever the magnet was withdrawn.

No doubt now remaining as to the facts, and being in possession of the position of its poles, I proceeded to examine the effects produced by this cause upon the watch's rate of going. Having put on the pendulum spring, and replaced the balance in the watch, I laid the watch with the dial upward, that is, with the plane of the balance horizontally, and in such a position that the balance when at its place of rest should have its marked side toward the north; in this situation it gained 5′ 35″ in twenty-four hours. I then changed its position so that the marked side of the balance when at rest should be toward the south, and observing its rate of going for the next twenty-four hours, found it had lost 6′ 48″, producing by its change of position alone a difference of 12′ 23″ in the rate.

It must be obvious to every person, that even this difference, great as it was, would be increased or diminished as the wearer should happen to carry in his waistcoat pocket a key, a knife, or other article made of steel. This circumstance, taken along with the amount of the variation occasioned by the polarity of the balance, was fully sufficient to produce all the irregularity observed in the going of the watch. I then took away the steel balance, substituted one made of gold, and found it as uniform as any watch of the like construction; for though it was a duplex escapement, which is perhaps the best yet invented, at least for common purposes, it had no compensation for the expansion and contraction by the heat and cold, and therefore a perfect performance was not expected. Steel balances being commonly in use, and on that account easiest to be procured, and being on many accounts preferable to any other, I was unwilling to abandon them entirely, but resolved to take the precaution of always trying them before I should apply them to use. The mode I adopted was, to lay them upon a slice of cork sufficient to make them float upon water, and I was in hopes that out of a considerable number I might be able to select sufficient for my purpose; but, to my surprise, of many dozens which I tried in this manner, I could not select one that had not polarity. Some of them had it but in a weak degree, and not more than one or two out of the whole quantity appeared to have it so strong as the one which gave birth to these experiments and to the present paper, which is perhaps more prolix than could be wished; but the subject appeared to be not uninteresting, and I hope the remarks I have offered will be not altogether useless, as everything that can tend to add to the perfection of time-pieces, to remove any cause that operates against their perfection, is of some importance.

SOME English capitalists are about to dispatch workmen to New Zealand to commence the business of preserving mutton. The meat is to be put up in tin cans of various sizes. Meat has thus been successfully and profitably shipped from Australia to England, and there is no good reason why it may not be transported any distance in this manner.

ON ROPEMAKING.

(From Chapman's Treatise.)

HEMP.

Seed to be sown, should be of the preceding year, because it is an oily grain, and is apt to become rancid if kept too long; it is also advisable to choose the seed every second year from a different soil.

The time for sowing is from the beginning to the end of April; if sown earlier, the plants become tender, the frost will injure, if not totally destroy them. The plants should be left thick, as without this precaution, the plants grow large, the bark woody, and the fibers harsh.

The ripeness of the male plant is known by the leaves turning yellow, and the stem of a whitish color; and the ripeness of the female, by the opening of the pods so much that the seed may be seen—they will have a brownish appearance.

The harvest for pulling the male is about August, the female not being fit until Michaelmas. When gathered, it is taken by the root end in large handfuls, and with a wooden sword the flowers and leaves are dressed off—twelve hands form a bundle, head, or layer. It is immersed in water as soon as possible; as by drying, the mucilage hardens, and it requires a more severe operation to develop the bark than when macerated directly, which is injurious to the fiber. If let lie in water too long, the fibers are too much divided, and by an undue dissolution of the gum, would not have the strength to stand the effort it should, in being dressed. But if not sufficiently steeped, it becomes harsh, coarse, non-elastic, and encumbered with woody shives, which is a great defect. The next operation is to separate the fibers from the stem; this is done by a process called scutching, formerly practiced, but now by a machine called a brake; the operation is only breaking the reed or woody part, for the fiber itself, of which is the filamentous substance; hemp only bends, and does not break. The strength of the longitudinal fibers is superior to the fibers by which they are joined; or, in other words, it requires more to break them than to separate them from one another, as rubbing or beating causes the longitudinal fiber to separate, and in proportion to the greater or less degree of that separation, it becomes more or less fine, elastic, and soft.

When intended for cordage or coarse yarn, it requires only to be drawn through a coarse heckle; but if for fine yarn, through heckles of various degrees of fineness. In this process the pins carry off a part of the gum in the form of dust, which is very pernicious, and by dividing the fibers, separate entirely the heterogeneous mass. To effect this, the heckle is fixed upon a frame, one side inclining from the workman, who, grasping a handful of hemp in his hands, draws it through the heckle pins, which divides the fibers, cleanses and straightens them, and renders the hemp fit for spinning; if the fibers were spun longitudinally, the yarn would be stronger, would more easily join, and require less twist.

SPINNING.

When the spinner has placed the hemp around him, he commences by taking hold of the middle of the fibers, and attaching them to the rotary motion that supplies twist, which, upon receiving, he steps backwards, doubling the fibers in the operation. When the yarn is spun, it is warped into hauls or junks, which contain a certain number of threads or yarns in proportion to the size and weight. The hauls are then tarred, if required. The tar should be good, and of a bright color when rubbed by the fingers—Archangel being the best; mixing with it, at times, a portion of Stockholm, to ameliorate and soften that which has been boiled, as by repeated boiling it becomes of a pitchy consistency, and makes the cordage stiff, difficult to coil, and liable to break. The tar should at first be heated to a temperature of 220 degrees of Fahrenheit previous to commencing operations, so that the aqueous matter may be evaporated, and any dirt or other dense matter precipitated and taken out, thereby cleansing it from all impurities; as the yarn, passing through the tar, takes or draws in a quantity of moisture, and the atmospheric air in contact with the surface has a tendency to lower the temperature, it never should descend while in operation below 212 degrees to evaporate that moisture. The yarn should not pass through the tar at a greater speed than fifteen feet per minute, to allow it to imbibe a sufficient quantity to prevent decay, and cause an amalgamation to take place, rendering the cordage more durable in exposed situations, weaker by its adhesion to the fiber which makes it more rigid, and destroys a small portion of its strength and elasticity. After being tarred, the hauls are left for several hours to allow any moisture to evaporate; it is then coiled into the yarn-house, and left for several days to allow the tar to harden, and adhere more closely to the fiber; otherwise, should it be made into cordage directly after being tarred, the tar would press to the surface, decay take place in the center, and give the cordage an unsightly appearance. When the hauls have lain a time in store, they are wound upon bobbins, the haul being stretched along the floor of a shed; and each end being formed in loops or bights, are placed upon hooks, and made taut by tackles; the workman takes the end of four yarns, separates them, and, passing each end through a gage, attaches them to bobbins placed upon a machine to receive them, called a winding machine. When the bobbins are full, they each contain about 500 fathoms of yarn, or in proportion to the size of the yarn, and are taken from the machine and replaced by empty ones, and the operation proceeds.

The bobbins of yarn are then taken to a frame made to receive them, and the ends passed through a metallic plate perforated with holes in concentric circles; each yarn is passed through a single hole to the number of yarns required to form a strand; the whole are then brought together, and drawn through a cylindrical metallic tube, having a bore equal in diameter to the number of yarns when compressed. It is then attached to a machine which is drawn down the rope-walk by steam or some other power; at the same time a rotatory motion is given to twist the yarns into a strand, making an uniform cylinder. These machines are called registers, because they register the length. Forming, giving a proper formation, and equalizing for the equality of twist given the strands over the old method.

There are other machines for making cordage upon more scientific principles, and which give a greater uniformity of twist or angle, such us Captain Huddart's, for these reasons: —the backward traveling movement of any register, forming, or equalizing machine that is or may be used in a rope-walk, or the retrograde movement of such a machine towards the bottom of the walk to which the strands are drawn, and where the most improved and best principle is or may be adopted, has hitherto been found defective. The machines being worked by ropes applied in different ways, causes non-uniformity in the twist or angle; as, in some cases, the rope is made to draw the machine by fastening one of its ends to the machine and the other to a capstan at the bottom of the walk, the twist being given by the rotatory motion of the wheels upon which it travels; in other cases, a rope, termed a ground-rope, is made fast at each end of the walk, and, having one or more turns round the barrel of the machine, gives the required twist to the stands. Also an endless rope passing from one end of the walk to the other, the one end passing round a movable pulley, the other round a capstan, with power to drive the machine; the rope is then passed round a gab-wheel upon the machine the capstan being put in motion, the endless rope drives the gab-wheel, and causes the machine to retrograde or travel along the ground-rope which gives motion to the pinions, and twist the strands. The great object to be obtained is in regulating the retrograding or traveling motion, and to preserve a certain speed in a given time, in order that the strands may receive a proper degree of twist in a certain length.

The next operation, the strands are made into a rope by being attached to the machines at each end of the walk, and brought to a certain degree of tension by the means of tackles; a wood frame, called a drag, is made fast to the machine, and some heavy material placed upon it to retain that tension when released from the tackles. The machines are then put in motion, and as the strands receive tortion they shorten in their length—this is called hardening; but from various causes, during this process, an inequality of tension takes place, one strand becoming slack and the others tight, therefore of unequal lengths, although originally of equal lengths, and received the same number of twist or turns by machines of the most approved principle. The method practiced to remedy this, is to twist up the slack strand, making it harder and smaller, and consequently it cannot lay evenly in the rope, and will be the first to break. It is also obvious that an after-twist must be given the rope to cause the strands to unite, as for every twist given the rope the same is taken from the strands; hence the same number of twists the rope receives, the same number must be given to the strands, and any increase given the rope in making or rounding cannot be retained, but must come out when the rope is put upon a strain. When the strands have received a sufficient hardness of twist, they are placed upon one hook upon one of the machines; a cone of wood, called a top, with grooves cut in the surface sufficiently large to receive the strands, is then put between them; the machines are then put in motion, the strands made to bear equally, the tails wrapped around the rope, and all is ready for closing. The machine that twists the rope being set so as to make two revolutions, while the machine that twists the strands makes but one revolution; this extra revolution given the rope being requisite to overcome the friction which is caused by the top, tails, and the stake heads which are placed at every five fathoms to support the strands and rope, and which extra revolutions cannot be retained in the rope.

Acid Proof Cement.

R. F. Fairthorne writes to the *Journal of the Franklin Institute* that he has found the best preservative for corks exposed to acids to consist of a coating of silicate of soda and powdered glass. The cork having been bored to suit the size of the tube, is soaked for two or three hours in a solution of silicate of soda, consisting of one part of commercial concentrated solution, to three parts of water. The tube is next inserted, and when dry, the cork is covered with a paste made by mixing the condensed solution of the silicate with powdered glass in such proportion as to form a mass of about the same consistence as that of putty. This is spread on the under surface, and then washed with a solution of chloride of calcium. It soon hardens, but it is advisable to make the connection with the flask while the paste is in a plastic state, and to allow it to become solid before applying heat to the vessel containing the acid.

Corks protected in this manner are but slightly acted upon, though remaining over the boiling nitric acid more than four hours, and over hot acid for ten. In some instances, when not entirely covered, the vapor softens the cork beneath the silicate to the depth of about a quarter of an inch, but the cement has proved sufficiently strong to form a compact diaphragm, enabling the tube to be removed from the flask without danger of the fluid contained being contaminated. The application of this cement as a luting for chemical apparatus for general use, is suggested, as it is found that it remains unaffected even when immersed in strong nitric, sulphuric, or muriatic acids. The immersion in these liquids, made while the plaster is still soft, has the only perceptible effect of hardening the same immediately.